

# Exhibit C

Prepared: May 27, 2024

**University of California, San Francisco**  
**CURRICULUM VITAE**

**Name:** John Kornak, PhD

**Position:** Professor In Residence, Step 3  
Epidemiology & Biostatistics  
School of Medicine

**Address:** Box 0560  
550 16th St, 2nd Floor  
University of California, San Francisco  
San Francisco, CA 94143  
Voice: 514-8028  
Fax: 514-8150  
Email: john.kornak@ucsf.edu

**EDUCATION**

1990 - 1991	Aristotle University of Thessaloniki, Greece	Diploma	Modern Greek Language
1993 - 1996	University of Nottingham, UK	B.Sc.	Mathematics with Statistics
1996 - 2000	University of Nottingham, UK	Ph.D.	Statistics

**LICENSES, CERTIFICATION**

1999 Gradstat accreditation with the Royal Statistical Society

**PRINCIPAL POSITIONS HELD**

1999 - 1999	Part-time Lecturer	University of Nottingham, UK	Engineering
2000 - 2000	Post-Doctoral Fellow	MRC Institute of Hearing Research, UK	
2000 - 2002	Post-Doctoral Researcher	University of California, San Francisco	Radiology
2002 - 2003	Post-Doctoral Researcher	The Ohio State University	Statistics
2003 - 2003	Senior Research Statistician	Northern California Institute for Research and Education	

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2003 - 2006	Assistant Adjunct Professor	University of California, San Francisco	Radiology
2006 - 2010	Assistant Professor In Residence	University of California, San Francisco	Radiology and Biomedical Imaging
2010 - 2016	Associate Professor In Residence	University of California, San Francisco	Epidemiology and Biostatistics
2016 - present	Professor In Residence	University of California, San Francisco	Epidemiology and Biostatistics

#### **OTHER POSITIONS HELD CONCURRENTLY**

2003 - 2006	University of California, San Francisco	Assistant Adjunct Professor	Epidemiology and Biostatistics
2006 - 2010	University of California, San Francisco	Assistant Professor In Residence	Epidemiology and Biostatistics
2006 - 2010	University of California, San Francisco	Director of Biostatistics Consulting Service	Radiology and Biomedical Imaging
2009 - present	University of California, San Francisco	Biostatistics Faculty Consultant	CTSI Consulting Service
2014 - present	University of California, San Francisco	Director of Biostatistics Consulting Unit	CTSI Consulting Service
2017 - present	Lawrence Livermore National Laboratories	Visiting Scholar	
2019 - present	University of California, San Francisco	Head of Health Data Science Master's/Certificate Program	Epidemiology and Biostatistics

#### **HONORS AND AWARDS**

1997	Travel and registration award	Case Studies in Bayesian Statistics Workshop IV, Carnegie Mellon University, Pittsburgh, PA
1998	Invited attendee (with travel grant award) - Summer School on Markov Chain Monte Carlo Simulation, Rebild, Denmark	Highly Structured Stochastic Systems

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1999	Travel and registration grant award - Second European Conference on Highly Structured, Stochastic Systems Conference, Pavia, Italy	Highly Structured Stochastic Systems
1998	Elected Fellow	The Royal Statistical Society, UK
2003	Travel and registration award	International Workshop on Bayesian Data Analysis, University of California, Santa Cruz
2006	Travel grant award	UCSF Academic Senate
2006	Elected Vice President for Biostatistics of the Bay Area Chapter	The American Statistical Association
2007	Travel grant award	UCSF Academic Senate
2007	President-Elect for the Bay Area Chapter	The American Statistical Association
2008	President of the Bay Area Chapter	The American Statistical Association
2009	Past-President of the Bay Area Chapter	The American Statistical Association
2009	Consultant of the Year - Consistent Excellence Award	UCSF, CTSI
2010	Consultant of the Year - Impact Award	UCSF, CTSI
2010	Elected Council of Chapters Representative	The American Statistical Association
2011	Consultant of the Year - Excellence Award	UCSF, CTSI
2014	Elected Chair of Statistics in Imaging Section for 2016	The American Statistical Association
2024	Selected as Fellow of the American Statistical Association	The American Statistical Association

#### **KEYWORDS/AREAS OF INTEREST**

Bayesian decision analysis, Bayesian image analysis, Bayesian image analysis in Fourier space, Bayesian statistics, breast cancer imaging, Fourier methods, location error, magnetic resonance imaging methods, Markov random fields, medical imaging, image classification for differentiating dementia types, imaging of neurodegenerative diseases, spatial statistics, statistical consulting, statistical methods for medical imaging, statistical image reconstruction, voxel-based statistics.

#### **CLINICAL ACTIVITIES**

#### **CLINICAL ACTIVITIES SUMMARY**

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## PROFESSIONAL ACTIVITIES

### MEMBERSHIPS

- 1998 - present Royal Statistical Society  
2000 - present Institute of Mathematical Statistics  
2002 - present American Statistical Association  
2003 - present International Society for Bayesian Analysis  
2020 - present Computational and Methodological (CM) Statistics  
2023 - present Bernoulli Society

### SERVICE TO PROFESSIONAL ORGANIZATIONS

2006 - 2006	Western North American Region of the International Biometric Society	Session Organizer for 2006 Annual Meeting
2006 - present	Center for Research and Technology, Thessaly, Greece	External Collaborator
2006 - 2007	Flinders University of South Australia	Statistical Consultant
2006 - 2007	The American Statistical Association, San Francisco Bay Area Chapter	Vice President of Biostatistics
2007 - 2008	The American Statistical Association, San Francisco Bay Area Chapter	President-Elect
2008 - 2009	The American Statistical Association, San Francisco Bay Area Chapter	President
2009 - 2009	International Chinese Statistical Association	Session Organizer for 2009 Annual Meeting
2010 - 2010	National Science Foundation (NSF)	Ad hoc reviewer
2010 - 2010	The American Statistical Association, San Francisco Bay Area Chapter	Past President
2010 - 2014	The American Statistical Association	Council of Chapters Representative for the San Francisco Bay Area Chapter

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2012 - 2012	National Institutes of Health (NIH) -- Neurological, Aging and Musculoskeletal Epidemiology Study Section (NAME)	Ad hoc reviewer
2014 - present	National Aeronautics and Space Administration (NASA)	Member of Finite Element Modeling (FE) Task Group
2015 - 2016	Complex Systems Model of Breast Cancer Etiology Project - funded by California Breast Cancer Research Program	Member of Advisory Committee
2015 - 2015	The American Statistical Association	Chair-Elect of the Statistics in Imaging Section
2016 - 2016	The American Statistical Association	Chair of the Statistics in Imaging Section
2016 - 2019	National Institutes of Health (NIH) -- Biostatistical Methods and Research Design Study Section (BMRD)	Ad hoc reviewer
2017 - 2017	National Institutes of Health (NIH) -- Special Section: NCI Clinical and Translational Exploratory/Developmental Studies (R21) and NCI Small Grants Program for Cancer Research (NCI Omnibus R03)	Ad hoc reviewer
2017 - 2017	Alzheimer's Association/GBHI -- Pilot Awards for Global Brain Health Leaders program	Ad hoc reviewer
2018 - 2021	Steering Committee Member for Annual Mettings of the Statistics in Imaging Section	Committee Member
2020 - 2020	National Institutes of Health (NIH) -- Special Emphasis Panel: Secondary Analyses of Existing Datasets in Heart, Lung, and Blood Diseases and Sleep Disorders (R21)	Ad hoc reviewer
2021 - 2021	Computational and Methodological Statistics (CMStatistics)	Scientific Program Committee Member
2021 - 2022	National Institutes of Health (NIH) -- Biostatistical Methods and Research Design Study Section (BMRD)	Study Section Member and Co-Chair
2022 - 2025	National Institutes of Health (NIH) -- Analytics and Statistics for Population Research Panel A Study Section (ASPA)	Study Section Member and Co-Chair
2022 - 2022	Computational and Methodological Statistics (CMStatistics)	Co-Chair
2023 - 2024	Workshop on Challenges in Neuroimaging Data Analysis	Organizing Committee Member

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## SERVICE TO PROFESSIONAL PUBLICATIONS

- 2004 - 2005 Scandinavian Journal of Statistics - ad hoc referee  
2005 - 2006 Canadian Journal of Statistics - ad hoc referee  
2005 - present Biometrics - ad hoc referee  
2007 - present Magnetic Resonance in Medicine - ad hoc referee  
2008 - present Computer Methods and Programs in Biomedicine - ad hoc referee  
2009 - 2013 Frontiers in Neuroscience - Review Editor  
2009 - present Journal of Neuroscience Methods - ad hoc referee  
2009 - present Annals of Neurology - ad hoc referee  
2010 - present Statistics in Medicine - ad hoc referee  
2011 - present Statistics and its Interface - ad hoc referee  
2011 - present Australian & New Zealand Journal of Statistics - ad hoc referee  
2013 - present IEEE Transactions on Medical Imaging - ad hoc referee  
2017 - present BMJ Open - ad hoc referee  
2017 - present Journal of the Royal Statistical Society, Series C, Applied Statistics - ad hoc referee  
2022 - present Neuropsychologia - ad hoc referee  
2022 - present NeuroImage - ad hoc referee  
2023 - present Transactions on Biomedical Engineering - ad hoc referee  
2024 - present Magnetic Resonance Imaging - ad hoc referee

## INVITED PRESENTATIONS - INTERNATIONAL

- 1999 "A Bayesian multiplicative Markov random field model of fMRI haemodynamic response parameters", Highly Structured Stochastic Systems Workshop on Statistical Modelling of Spatial and Space-Time Processes, Luminy, France Invited Speaker  
1999 "A Bayesian multiplicative Markov random field model for fMRI haemodynamic response parameters", Department of Statistics Seminar Series, University of Nottingham, UK Invited Speaker  
2006 "New statistical methods in functional imaging", Western North American Region of the International Biometric Society Meeting Session discussant, Flagstaff, AZ Invited Discussant  
2009 "K-Bayes Reconstruction", Frontiers in Imaging of Neurodegenerative Diseases - Satellite Symposium to the Annual Meeting of the Organization for Human Brain Mapping, San Francisco, CA Invited Speaker

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2009	"Statistical reconstruction of low-signal-to-noise-ratio MRI modalities", International Chinese Statistical Association Applied Statistics Symposium, San Francisco, CA	Invited Speaker
2010	"Introductory Concepts for Voxel-Based Statistical Analysis", Advanced Statistical Concepts for Multimodal MRI Workshop, San Francisco, CA	Invited Speaker
2014	"Bayesian Image Analysis in Fourier Space", Joint Statistical Meetings, Boston, MA	Invited Speaker
2015	"Bayesian Image Analysis in Fourier Space", Probability and Statistics Seminar Series, University of Nottingham, UK	Invited Speaker
2016	"Bayesian Image Analysis in Fourier Space", International Society for Bayesian Analysis World Meeting, Sardinia, Italy	Invited Speaker
2016	"Classifying dementia based on volumetric MRI", Joint Statistical Meetings, Chicago, IL	Invited Speaker
2018	"Bayesian image analysis in Fourier space for MRI data", Joint Statistical Meetings, Vancouver, British Columbia, Canada	Invited Speaker
2018	"A new approach to Bayesian image analysis", Department of Statistics Seminar, Athens University of Economics and Business, Greece	Invited Speaker
2018	"A new approach to Bayesian image analysis", International Conference of the ERCIM WG on Computational and Methodological Statistics, University of Pisa, Italy	Invited Speaker
2019	"Bayesian image analysis in transformed spaces", Statistics Meeting Following the Organization for Human Brain Mapping (OHBM) Meeting: Recent Advances on Modeling and Inference for Brain Signals and Images. Sapienza University of Rome, Italy	Invited Speaker
2019	"On the Bayesian spatial analysis of brain activation in fMRI", Joint Statistical Meetings, Denver CO	Invited Speaker
2019	"A Somewhat Gentle and Incomplete Introduction to Bayesian Image Analysis in 1) Image and 2) Fourier Space", Modern Statistical Methods: from Data to Knowledge, Krakow, Poland	Invited Speaker
2019	"Bayesian image analysis in transformed spaces (mostly Fourier)", Jerzy Neyman Statistical Session. Jubilee Congress for the 100th Anniversary of the Polish Mathematical Society, Krakow, Poland	Invited Speaker

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2019	"A new approach to Bayesian image analysis (in transformed spaces)", Statistics 5, Aegina, Greece	Invited Speaker
2019	"Bayesian image analysis in transformed spaces", CMStatistics, London, UK.	Invited Speaker
2020	"Bayesian image analysis in Fourier space using data-driven priors (DD-BIFS)", International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems. Lisbon, Portugal	Invited Speaker
2020	"Bayesian image analysis in Transformed spaces (BITS) and the BIFS/WIMP Python packages", Mini-Symposium on Advanced statistical methods for the analysis of high-dimensional data. Annual conference of the International Society for Clinical Biostatistics Meeting. Krakow, Poland.	Invited Speaker
2020	"Bayesian image analysis in Transformed spaces (BITS) and the BIFS/WIMP Python packages", CMStatistics, London, UK.	Invited Speaker
2021	"Bayesian image analysis in Fourier space (BIFS) models and some relationships with Markov random fields", King Abdullah University of Science and Technology, Saudi Arabia	Invited Speaker
2021	"Common problems in (bio)-statistics and data science and how to avoid them", King Abdullah University of Science and Technology, Saudi Arabia	Invited Speaker
2021	"Bayesian image analysis in Fourier space models and some relationships with Markov random fields", CMStatistics, London, UK.	Invited Speaker
2022	"Nonlinear Z-score estimation for establishing cognitive norms", Joint Statistical Meetings, Washington DC	Invited Speaker
2023	"Modeling longitudinal trajectories of dementia brain changes", BIRS-CMO Workshop: Statistical Challenges for Complex Brain Signals and Images, Oaxaca, Mexico	Invited Speaker
2023	"Bayesian image analysis in Fourier space (BIFS) models", International Indian Statistical Association Conference, Golden, Colorado	Invited Speaker
2023	"Bayesian image analysis in Fourier space (BIFS) models", EcoSta 2023, Tokyo, Japan	Invited Speaker
2023	"Some experiences designing Biostatistics and Data Science courses for Clinical Researchers", Joint Statistical Meetings, Washington DC	Invited Speaker

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- 2023 "Practical modeling of longitudinal neuropsychological and neuroimaging brain change", Modern Statistical Methods II, Krakow, Poland Invited Speaker
- 2023 "Modeling longitudinal trajectories of dementia brain changes", CMStatistics 2023, Berlin, Germany Invited Speaker

#### **INVITED PRESENTATIONS - NATIONAL**

- 2001 "Improved resolution of spectroscopic images using Bayesian reconstruction", Department of Statistics, The Ohio State University Invited Speaker
- 2003 "Issues relating to the statistical analysis of fMRI hemodynamic response parameters", School of Public Health, The Ohio State University Invited Speaker
- 2003 "Issues in the statistical analysis of fMRI data", Mathematical Biosciences Institute Workshop on Statistical and Mathematical Modeling of fMRI Data, The Ohio State University Invited Speaker
- 2005 "Bayesian reconstruction of low resolution MR imaging modalities using high resolution structural MRIs as prior information", Department of Biophysics Seminar Series, Medical College of Wisconsin Invited Speaker
- 2008 "K-Bayes Reconstruction of Physiologic MRI" Annual Meeting of the Society for Imaging Informatics in Medicine 8th Annual Research and Development Symposium, Seattle, WA Invited Speaker
- 2015 "Bayesian Image Analysis in Fourier Space", Statistical Methods in Imaging Workshop, University of Michigan, MI Invited Speaker
- 2017 "Bayesian Image Analysis in Fourier Space", Mathematics, Statistics, and Computer Science Colloquium, Marquette University, Milwaukee, WI Invited Speaker
- 2017 "Estimating and validating dementia class probabilities based on volumetric MRI", Collaborative Case Study, Statistical Methods in Imaging Workshop, University of Pittsburgh, PA Invited Speaker
- 2018 "Statistical analysis of MRI of the Breast in the Presence of Background Parenchymal Enhancement", Collaborative Case Study, Statistical Methods in Imaging Workshop, University of Pennsylvania, PA Invited Speaker
- 2018 "Bayesian image analysis in Fourier space for Medical Imaging", Statistical Methods in Imaging Workshop, University of Pennsylvania, PA Invited Speaker

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2018	"A new approach to Bayesian image analysis", Western Meeting of the American Mathematical Society, San Francisco State University, CA	Invited Speaker
2018	"A new approach to Bayesian image analysis", Workshop on Data Analytical Methods, National Institute of Aging, Alzheimer's Disease Centers Program Meeting, Atlanta, GA	Invited Speaker
2018	"Nonlinear Normative Score Calculators for NACC UDS V3 Cognitive Tests", National Institute of Aging, Alzheimer's Disease Centers Program Meeting, Atlanta, GA	Invited Speaker
2019	"Using brain atrophy measures to predict dementia onset in familial frontotemporal lobar degeneration", Statistical Methods in Imaging Workshop, University of California, Irvine, CA	Invited Speaker
2021	"Bayesian image analysis in transformed spaces (BITS) and the BIFS/WIMP packages", Statistical Methods in Imaging Workshop, Emory University, Atlanta, GA	Invited Speaker
2021	"Bayesian image analysis in Fourier space (BIFS) models and some relationships with Markov random fields", Cornell University, New York.	Invited Speaker
2021	"Bayesian image analysis in Fourier space (BIFS) models and some relationships with Markov random fields", Columbia University, New York.	Invited Speaker
2023	"Bayesian modeling for longitudinal trajectories of dementia brain changes", Statistical Methods in Imaging Workshop, University of Minnesota, Minneapolis, Minnesota	Invited Speaker
2023	"Modeling longitudinal trajectories of neuropsychological and neuroimaging brain changes", University of Pittsburgh, Pennsylvania	Invited Speaker
2023	"Modeling longitudinal trajectories of dementia brain changes", University of North Carolina, Chapel Hill, North Carolina	Invited Speaker
2024	"Bayesian image analysis in Fourier space (BIFS)", Statistics in Imaging Working Group, Statistics in Imaging Section of American Statistical Association (via Zoom)	Invited Speaker

#### **INVITED PRESENTATIONS - REGIONAL AND OTHER INVITED PRESENTATIONS**

2002	"Improving resolution for studying brain biochemistry with MRSI", Neyman Seminar Series, Department of Statistics, UC Berkeley	Invited Speaker
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2008	"Bayesian Decision Analysis for Choosing Between Diagnostic Procedures", Meeting of the San Francisco Bay Area Chapter of the American Statistical Association	Invited Speaker
2014	"Bayesian Image Analysis in Fourier Space, with Applications in Medical Imaging", University of California, Davis Graduate Group in Biostatistics Seminar Series	Invited Speaker
2015	"Bayesian Image Analysis in Fourier Space, with Applications in Medical Imaging", Stanford Research Institute	Invited Speaker
2015	"Bayesian Image Analysis in Fourier Space, with Applications in Medical Imaging", Meeting of the San Francisco Bay Area Chapter of the American Statistical Association	Invited Speaker
2015	"Bayesian Image Analysis in Fourier Space (with Applications in Medical Imaging)", Genentech, South San Francisco	Invited Speaker
2016	"Bayesian Image Analysis in Fourier Space (with Applications in Medical Imaging)", University of California, Berkeley, Statistics and Genomics Seminar	Invited Speaker
2017	"Bayesian Image Analysis in Fourier Space", University of California, Santa Cruz, Jack Baskin School of Engineering	Invited Speaker
2017	"Bayesian Image Analysis in Fourier Space", Lawrence Livermore National Laboratories.	Invited Speaker
2017	"Bayesian Image Analysis in Fourier Space", University of California, Berkeley. Biostatistics Seminar Series	Invited Speaker
2017	"A Collection of UCSF Imaging and Spatial Datasets", University of California, Santa Cruz, Jack Baskin School of Engineering	Invited Speaker
2017	"Non-linear Z-scores calculation for Neuropsych data" ARTFL/LEFFTDS Investigators Meeting, New Orleans, LA	Invited Speaker
2018	"Validation and the automated classification of dementias with MRI", Lawrence Livermore National Laboratories.	Invited Speaker
UCSF PRESENTATIONS:		
2000	"A Bayesian multiplicative MRF model of fMRI hemodynamic response parameters", MR Unit, VAMC/UCSF	Invited Speaker
2003	"Issues in the statistical analysis of fMRI data", Department of Epidemiology and Biostatistics, UCSF	Invited Speaker

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2004	"Improving the effective resolution of low signal magnetic resonance imaging modalities by incorporating high resolution structural information", Department of Epidemiology and Biostatistics, UCSF	Invited Speaker
2004	"A Bayesian spatial analysis of fMRI data along with some issues for modeling the hemodynamic response", Cogneuro Meeting, Department of Radiology, UCSF	Invited Speaker
2004	"Issues in the statistical analysis of fMRI data", Neuroradiology Conference, Department of Radiology, UCSF	Invited Speaker
2004	"Statistics for medical imaging", Neuroradiology Conference, Department of Radiology, UCSF	Invited Speaker
2005	"Improved resolution for low resolution magnetic resonance imaging modalities", MR Unit, Brain Imaging Research Seminar Series, Department of Radiology, UCSF	Invited Speaker
2005	"Introduction to Markov chain Monte Carlo methods for Bayesian image analysis", MR Unit, Workgroup on Acquisition Reconstruction and Processing Seminar Series, Department of Radiology, UCSF	Invited Speaker
2005	"Introduction to Classification Methods", Center for Imaging of Neurodegenerative Diseases, Brain Imaging Research Seminar Series, UCSF	Invited Speaker
2006	"An Overview of Survival Analysis", Center for Imaging of Neurodegenerative Diseases, Brain Imaging Research Seminar Series, UCSF	Invited Speaker
2006	"Introduction to Bayesian Statistics", Center for Imaging of Neurodegenerative Diseases, Brain Imaging Research Seminar Series, UCSF	Invited Speaker
2006	"Bayesian Decision Analysis for Choosing Between Diagnostic Methods", Department of Epidemiology and Biostatistics Program Meeting, UCSF	Invited Speaker
2007	"Regression Towards the Mean and the Prediction of Cognitive Decline", Center for Imaging of Neurodegenerative Diseases, Department of Radiology and Biomedical Imaging, UCSF	Invited Speaker
2007	"Bayesian Methods for PET/CT and SPECT/CT" - Center for Molecular and Functional Imaging, Department of Radiology and Biomedical Imaging, UCSF	Invited Speaker
2009	"Are correlations in social neuroscience really Voodoo?" Neuroscience Imaging Center fMRI Research Meeting, UCSF	Invited Speaker

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2015	"Bayesian Image Analysis in Fourier Space, with Applications in Medical Imaging", Center for Imaging of Neurodegenerative Diseases, Department of Radiology and Biomedical Imaging, UCSF	Invited Speaker
2015	"An Overview of Bayesian Statistics, with Applications in Medical Imaging", Department of Neurology, Memory and Aging Center Grand Rounds	Invited Speaker
2015	"Bayesian Statistics 2: Bayesian Image Analysis, and Bayesian Image Analysis in Fourier Space", Department of Neurology, Memory and Aging Center Grand Rounds	Invited Speaker
2018	"Bayesian Image Analysis in Fourier Space and Potential Application for Breast MRI", Breast Research Interest Group Meeting, Department of Radiology and Biomedical Imaging	Invited Speaker
2021	"Computational Methods in Digital Health", Department of Epidemiology and Biostatistics Digital Health Initiative.	Invited Speaker and Panelist
2022	"Nonlinear normative scores for cognitive testing", UCSF Weill Institute for Neurosciences/Memory and Aging Center.	Invited Speaker
2022	"Bayesian statistics, Bayesian Image Analysis, and extensions to Fourier space (with an application in FTD diagnosis). UCSF Weill Institute for Neurosciences/Memory and Aging Center.	Invited Speaker
2022	"Two very different examples of statistical methodology development for understanding dementia." UCSF Weill Institute for Neurosciences/Memory and Aging Center.	Invited Speaker

#### **GOVERNMENT AND OTHER PROFESSIONAL SERVICE**

2007 - 2007	Advanced MRI Technologies, Sebastopol CA	Statistical consultant
2007 - 2008	Orthokinematics, San Francisco, CA	Statistical consultant
2011 - 2016	Bioclinica and Synarc, Newark, CA	Statistical consultant
2015 - 2015	Goodman Neuman Hamilton LLP	Expert witness / statistical consultant
2015 - 2015	Kelley Drye and Warren LLP	Expert witness / statistical consultant

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2015 - 2016	Carlson, Caspers, Vandenburg, Lindquist & Schuman	Expert witness / statistical consultant
2016 - present	Winston & Strawn LLP	Expert witness / statistical consultant
2016 - 2017	Haynes and Boone, LLP	Expert witness / statistical consultant
2017 - present	Latham and Watkins, LLP	Expert witness / statistical consultant
2020 - 2020	REsurety, Inc	Statistical consultant
2020 - 2021	Price, Parkinson, and Kerr, PLLC	Expert witness / statistical consultant
2022 - 2023	Cornerstone Research	Expert witness / statistical consultant

## UNIVERSITY AND PUBLIC SERVICE

### SERVICE ACTIVITIES SUMMARY

My service activities have been focused on my work as 1) the head of the UCSF Department of Epidemiology and Biostatistics Data Science Program; 2) Director of the CTSI Biostatistical Consulting Unit; 3) Departmental committee work, and 4) Reviewing for the NIH Analytics and Statistics for Population Research Panel A (ASPA) Study Section as a standing member.

1) In my role as Head of the Data Science Program I am responsible for developing the Data Science for Medicine education program at UCSF. This has culminated in the successful roll-out of the new Masters of Science and Certificate programs in Health Data Science (MiHDaS/CiHDaS) now in its second year. 2) I am Director of the Biostatistics Consulting Unit (BCU) with the UCSF Clinical and Translational Sciences Institute (CTSI). My work in this capacity involves managing a group of 4 salaried faculty consultants and 2 analysts as well as 15 hourly paid faculty consultants. The BCU provides campus-wide statistical consultation and collaboration, including help with optimal experimental designs, data analysis, reporting of results, and drafting or editing grant and paper statistical sections. 3) I am involved in numerous departmental committees including being a member of the Educational Leadership Group (ELG), Curriculum Evaluation Committee, Training in Clinical Research MAS program advisory committee, and the UCB-UCSF Computational Precision Health Sciences PhD program Executive Committee. 4) I have served as a standing member on the NIH Biostatistical Methods and Research Design (BMRD) and Analytics and Statistics for Population Research Panel A (ASPA) Study Sections.

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**UNIVERSITY SERVICE**  
**UC SYSTEM AND MULTI-CAMPUS SERVICE**

2018 - present	University of California, Santa Cruz, Graduate Division, Applied Mathematics and Statistics	Qualifying Exam Committee Member for Wenjie Zhao
2018 - present	University of California, Santa Cruz, Graduate Division, Applied Mathematics and Statistics	Qualifying Exam Committee Member for Laura Baracaldo
2018 - present	Data Safety and Monitoring Board for RCT of Phase II RCT of High-dose Vitamin D Supplements in Older Adults. PI John Olichney, UC Davis	Board Member and Current Chair
2020 - 2021	University of California, Berkeley -- University of California, San Francisco, Joint Program Working Group for PhD program in Computational Precision Medicine	Member
2021 - present	Data Safety and Monitoring Board for RCT evaluating in-home assistive technology for dementia caregivers, University of California, Berkeley, and People Power	Board Member and Chair
2021 - present	Computational Precision Health Graduate Group: University of California, Berkeley -- University of California, San Francisco	Executive Committee Member

**UCSF CAMPUSWIDE**

2006 - 2010	University of California, San Francisco, Department of Radiology and Biomedical Imaging	Director of the Biostatistics Consulting Service
2009 - present	Clinical and Translational Sciences Institute	Biostatistics Consultant
2010 - 2010	Robert Wood Johnson Foundation Health and Society Scholars program	Interviewer
2011 - present	Research Allocation Program Digital Health Research Committee (previously Mobile Health Research Committee)	Committee Member/ Reviewer
2014 - present	Clinical and Translational Sciences Institute	Director of Biostatistics Consulting Unit
2016 - 2016	Data Safety and Monitoring Board for Radiation Dose Study at UCSF. PI Rebecca Smith-Bindman	Board Member

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## DEPARTMENTAL SERVICE

-	DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS:	
2014 - 2014	Big Data Subcommittee	Subcommittee Member
2015 - 2017	Divisions of Biostatistics and Bioinformatics	Seminar Series Organizer
2015 - 2016	Reviewing Epidemiology PhD applications	Reviewer
2015 - 2016	Succession Committee	Committee Member
2017 - 2019	Search Committee for Biostatistics faculty positions	Committee Member
2017 - present	Data Science Subcommittee	Committee Member
2018 - 2019	Strategic Partnerships Working Group	Chair
2018 - 2019	Working group to examine Department of Epidemiology and Biostatistics organizational structure	Working group Member
2018 - present	Training in Clinical Research Advisory Committee	Member
2019 - present	Educational Leadership Group	Member
2020 - present	Curriculum Evaluation Committee	Member
2021 - 2021	Search Committee for new Head of Training in Clinical Research MAS and Certificate programs	Member
-	DEPARTMENT OF RADIOLOGY AND BIOMEDICAL IMAGING:	
2005 - 2005	Search Committee for an Assistant/Associate Professor position	Committee Member
2006 - 2007	Center for Molecular and Functional Imaging Committee for Fundraising	Committee Member
2007 - present	Department of Radiology and Biomedical Imaging Seed Grant Committee	Committee Member
2010 - 2010	Search Committee for an Assistant Professor position	Committee Member

## SERVICE AT OTHER UNIVERSITIES

1997 - 1998	Postgraduate Representative Research Committee for the Department of Mathematics	University of Nottingham, UK
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1997 - 2004	Webmaster and Mailing List Organizer	International Highly Structured Stochastic Systems (HSSS) organization
1998 - 1999	School of Mathematical Sciences Postgraduate Representative	Faculty of Science, University of Nottingham, UK

## TEACHING AND MENTORING

### TEACHING SUMMARY

As Head of the Data Science Program in the Department of Epidemiology and Biostatistics I have led the work to develop and run the new and successful Self-Supporting Master's of Science and Certificate's programs in Health Data Sciences. The program is now in its second year. For the first year we had 6 students who have now progressed to the Capstone projects of their second year. In the second year of running the program we have 22 new students.

In 2023/2024, I have been directing the Seminar programs for both the first year (Datasci 220) and second year (Datasci 221) health data science programs. In the first year, the seminars largely focus on UCSF and outside speakers presenting their research and proposing potential projects the students might be interested in getting involved with for Capstones. Also covered in these seminars are isolated topics in data science such as sample size calculations and ethical considerations. In the second year seminars, there is a transition toward students presenting the progress on their Capstone projects and receiving feedback from their fellow students and faculty. In both years students also have the opportunity to raise topics of their own and discuss general concerns.

In 2019 I developed a new course that was taught for the first time in the Spring of 2019 called Machine Learning with R for the Biomedical Sciences. I have now passed that course to a new faculty member and am now developing new courses on 1) Bayesian Statistics and Gaussian processes; and 2) Statistical and Data Science methods for medical imaging. These courses are hoped to begin 2024/2025.

Prior to 2018, my primary teaching activity was focussed on my role as Course Director of BIOSTAT 202 and BIOSTAT 209. BIOSTAT 202 is a course that I developed with my colleagues Drs. Charles McCulloch and Elaine Allen. The course was given for the first time in Summer 2016 and provides an introduction to the analysis of "Big Data" in biomedicine. BIOSTAT 209 is a biostatistics component of the UCSF TICR program focused on advanced statistical regression methods. I directed BIOSTAT 209 for the first time in Spring 2011 and ran the course annually until Spring of 2017. As Course Director for both courses, I organized the course structure, provide four 90 minute lectures each, organize the project component of the courses, and led homework sessions, labs and project sessions for each course.

Before taking over BIOSTAT 209 I had developed a new UCSF course: Radiology 170.06, Statistics for Radiology and Biomedical Imaging. The course consisted of ten two-hour lectures and was presented for the first time in Spring 2009 at UCSF. The course introduced statistical methods particularly relevant to people involved in the radiological/imaging sciences, where specialized statistical techniques or approaches are often required. Because this was primarily

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a non-statistical audience with a wide research background, this course required a delicate balance between providing enough information to explain the key statistical concepts while avoiding too much technical detail.

Additionally, I have lectured for the UCSF Department of Radiology lecture courses "Imaging Study Design" and "Medical Imaging Informatics".

I have mentored (and continue to mentor) numerous NIH K-grant awardees in the fields of biostatistics, data science, epidemiologic applications as well as clinical studies. I also act as a Committee Advisor for TICR program Masters students and I continue to provide informal lectures and teach students, postdoctoral researchers, residents, fellows and faculty on a one-to-one basis. This one-to-one teaching/mentoring activity primarily consists of work performed as a CTSI Biostatistics consultant, as well as work mentoring Training in Clinical Research (TICR) Masters students.

#### FORMAL TEACHING

	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2001 - 2002	Biophysics 203: Foundations for Mathematical Biology	Guest Lecturer: one 90 minute lecture	Grad	25-30
	2004 - 2005	Radiology 197: Statistics for Radiology Research.	Lecturer: five 90 minute lectures		20-25
	2005 - 2006	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		5
	2006 - 2007	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		6
	2006 - 2006	Lecture series: "Statistics for Radiology Residents". This course was directly pitched to Residents within the Department of Radiology and therefore aimed to provide enough information to explain the key statistical concepts while retaining minimal technical detail.	Joint Director with Dr. Ying Lu. I lectured on Repeated and Correlated Measures, Longitudinal Data Analysis, Time Series Models, Mixed Effects Models and Survival Analysis.		

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	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2007 - 2008	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		5
	2008 - 2009	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		10
	2008 - 2009	Radiology 170.06: Statistics for Radiology and Biomedical Imaging	Course Director and Lecturer: I teach 5 of 10 120 minute lectures		15-25
	2009 - 2010	IDS 102A: Organ Systems: Topics in Cardiovascular Pathophysiology, Epidemiology, Pharmacology & Physiology	Small Group Leader - 2 sessions	Medicine	12
	2009 - 2010	IDS 106: Mechanisms, Methods and Malignancy (M3) - Small Group Evidence Based Medicine	Small Group Leader - 2 sessions	Medicine	12
	2009 - 2010	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		10
	2010 - 2011	IDS 106: Mechanisms, Methods and Malignancy (M3) - Small Group Evidence Based Medicine	Small Group Leader - 2 sessions	Medicine	13
	2010 - 2011	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		10

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	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2010 - 2011	BIOSTAT 209: Biostatistical Methods for Clinical Research III	Course Director and Lecturer	Grad	58
	2011 - 2012	IDS 106: Mechanisms, Methods and Malignancy (M3) - Small Group Evidence Based Medicine	Small Group Leader - 2 sessions		13
	2011 - 2012	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		5
	2011 - 2012	Radiology 205: Imaging Study Design	Guest Lecturer: one 120 minute lecture	Grad	10
	2011 - 2012	BIOSTAT 209: Biostatistical Methods for Clinical Research III	Course Director and Lecturer	Grad	62
	2012 - 2013	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		8
	2012 - 2013	Radiology 205: Imaging Study Design	Guest Lecturer: two 90 minute consulting lectures	Grad	16
	2012 - 2013	BIOSTAT 209: Biostatistical Methods for Clinical Research III	Course Director and Lecturer		49
	2012 - 2013	EPI 150.03: Designing Clinical Research (One Month)	Guest Lecturer: one 75 minute lecture		70
	2013 - 2014	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		10

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	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2013 - 2014	Biostat 209: Biostatistical Methods for Clinical Research III	Course Director and Lecturer	Grad	63
	2013 - 2014	Radiology 205: Imaging Study Design	Guest Lecturer: two 90 minute consulting lectures	Grad	16
	2013 - 2013	Short course: Two day course on "Survival Analysis" at the UCSF Bixby Center.	I created and gave all of the short course. The course included 50% lectures and 50% labs.		
	2014 - 2015	Radiology 170.03: Medical Imaging Informatics	Lecturer: one 120 minute lecture		6
	2014 - 2015	Biostat 209: Biostatistical Methods for Clinical Research III	Course Director and Lecturer	Grad	51
	2014 - 2015	Radiology 205: Imaging Study Design	Guest Lecturer: two 90 minute consulting lectures	Grad	16
	2015 - 2016	Biostat 209: Biostatistical Methods for Clinical Research III	Course Director and Lecturer	Grad	71
	2015 - 2016	Radiology 205: Imaging Study Design	Guest Lecturer: two 90 minute lectures	Grad	16
	2016 - 2017	Biostat 202: Opportunities and Challenges of Complex Biomedical Data: Introduction to the Science of "Big Data"	Course Director and Lecturer	Grad	50
	2016 - 2017	Biostat 209: Biostatistical Methods for Clinical Research III	Course Director and Lecturer	Grad	43
	2016 - 2017	Radiology 205: Imaging Study Design	Guest Lecturer: two 90 minute lectures	Grad	16

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	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2017 - 2018	Biostat 202: Opportunities and Challenges of Complex Biomedical Data: Introduction to the Science of "Big Data"	Course Director and Lecturer	Grad	34
	2018 - 2019	Biostat 216: Machine Learning in R for the Biomedical Sciences	Course Director and Lecturer	Grad	17
	2019 - 2020	Biostat 216: Machine Learning in R for the Biomedical Sciences	Course Director and Lecturer	Grad	15
	2020 - 2021	Bioengineering 245: Machine Learning Algorithms for Medical Imaging	Guest Lecturer	Grad	10
	2022 - 2023	Bioengineering 245: Machine Learning Algorithms for Medical Imaging	Guest Lecturer	Grad	10
	2023 - 2024	Datasci 220: Data Science Program Seminar I	Course Director	Grad	26
	2023 - 2024	Datasci 221: Data Science Program Seminar II	Course Director	Grad	8
	-	FORMAL SCHEDULED CLASSES AT OTHER INSTITUTIONS:			

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	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	1999 - 2000	H71QMT: Quantitative Methods, School of Mechanical, Materials, Manufacturing Engineering and Management, University of Nottingham, UK	Lecturer of 22 one hour lectures plus 11 one hour tutorials		50-55
	2002 - 2003	Statistics 428: Introduction to Probability and Statistics for Engineering and the Sciences II, Department of Statistics, The Ohio State University	Lecturer of 30 one hour lectures plus 30 office hours/problems classes		45-50

### INFORMAL TEACHING

- 2003 - present Informal adviser and consultant for numerous students, postdoctoral researchers, residents, fellows and faculty at UCSF concerning clinical studies, applied statistical problems, and development of new statistical methods. In addition, biostatistical consulting through CTSI involves a large informal educational component.
- 2006 - 2006 Lecture series: "Statistics for Radiology Residents". This course was directly pitched to Residents within the Department of Radiology and therefore aimed to provide enough information to explain the key statistical concepts while retaining minimal technical detail. I was Joint Director with Dr. Ying Lu. I lectured on Repeated and Correlated Measures, Longitudinal Data Analysis, Time Series Models, Mixed Effects Models and Survival Analysis.
- 2013 - 2013 Short course: Two day course on "Survival Analysis" at the UCSF Bixby Center. I created and gave all of the short course. The course included 50% lectures and 50% labs.
- 2021 - 2021 Short course, 1 week: "Machine learning in R with applications in the biomedical sciences" at the Athens University of Economics and Business.

### MENTORING SUMMARY

I am an advisor for a PhD students in the Epidemiology program (Vignesh Arasu and Chloe Eng). I am also a mentor to Drs. Adam Staffaroni, Spina Salvatore, and Thu Nguyen for their respective NIH K-awards.

In addition, I am currently acting as a Master's students for the UCSF Training in Clinical Research (TICR) program and am a mentor to four recent early career recruitments that have

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focus in machine learning methods and the analysis of medical imaging. Finally, my consulting work through CTSI and elsewhere requires me to regularly mentor residents, fellows and students across campus.

#### PREDOCCTORAL STUDENTS SUPERVISED OR MENTORED

Dates	Name	Program or School	Mentor Type	Role	Current Position
2006 - 2006	Johanna Zumer	Bioengineering	Research/Scholarly Mentor	PhD committee member	PhD Student
2007 - 2010	Hao Zhang	Department of Biostatistics, University of California, Davis	Research/Scholarly Mentor	Joint Advisor	PhD Student
2007 - 2007	Qian Zhao	Visiting student to Department of Radiology from Sen Yat-San University, Guangzhou, China	Research/Scholarly Mentor	Joint Advisor	PhD Student
2012 - 2012	Alex Pankov	Epidemiology PhD Program, UCSF. BIO MI INF 221 Informatics rotation	Research/Scholarly Mentor	Spring Rotation Advisor	PhD Student
2013 - 2014	Patti Curl	Epidemiology and Biostatistics/CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Master's Committee Advisor	Training in Clinical Research Master's Student

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2014 - 2015	Susan Lee	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Master's Committee Advisor	Training in Clinical Research Master's Student
2014 - 2015	Jessica Cruz-Whitely	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Master's Committee Advisor	Training in Clinical Research Master's Student
2015 - 2016	Bardia Nourbakhsh	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Master's Committee Advisor	Training in Clinical Research Master's Student
2016 - 2017	Vignesh Arasu	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Master's Committee Advisor	MD Training in Clinical Research Master's Student
2016 - 2017	Anoop Sheshadri	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Master's Committee Advisor	MD Training in Clinical Research Master's Student

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2017 - 2017	Douglas Myers-Turnbull	Bio-Medical Informatics Graduate Program	Research/Scholarly Mentor	Qualifying committee member and advisor	PhD Student
2017 - 2021	Vignesh Arasu	Epidemiology PhD Program, UCSF	Research/Scholarly Mentor, Project Mentor	Advisor	PhD Student
2018 - 2019	Monica Ospina-Romero	Epidemiology and Biostatistics/CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Master's Committee Advisor	Training in Clinical Research Master's Student
2018 - 2021	Chloe Eng	Epidemiology PhD Program, UCSF	Research/Scholarly Mentor	Chair of Qualifying Exam Committee and F31 mentor	PhD Student
2020 - 2021	Carol Tran	Epidemiology and Biostatistics/CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Qualifying committee member and advisor	Training in Clinical Research Master's Student
2020 - 2021	Sophia Hernandez	Epidemiology and Biostatistics/CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Qualifying committee member and advisor	Training in Clinical Research Master's Student
2021 - 2021	Kostandinos Bakas	Athens University of Economics and Business	Research/Scholarly Mentor	Advisor for undergraduate thesis	Undergraduate Student

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Dates	Name	Program or School	Mentor Type	Role	Current Position
2021 - 2022	Carmen Lee	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Qualifying committee member and advisor	Training in Clinical Research Master's Student
2021 - 2022	Hannah Hoban	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Qualifying committee member and advisor	Training in Clinical Research Master's Student
2021 - 2022	Matthew Durstenfeld	Epidemiology and Biostatistics/ CTSI: Training in Clinical Research Program	Research/Scholarly Mentor	Qualifying committee member and advisor	Training in Clinical Research Master's Student
2018 - 2022	Laura Baracaldo	University of California, Santa Cruz	Research/Scholarly Mentor	Qualifying and dissertation committee member	PhD Student
2021 - present	Jingxuan Wang	Epidemiology PhD Program, UCSF	Research/Scholarly Mentor, Project Mentor	Qualifying and dissertation committee member and F99/K00 award mentor	PhD Student

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**POSTDOCTORAL FELLOWS AND RESIDENTS MENTORED**

Dates	Name	Fellow	Mentor Role	Faculty Role	Current Position
2003 - 2005	Satoru Hayasaka, PhD	Radiology, Postdoc	Research/Scholarly Mentor, Project Mentor, Career Mentor	Joint Advisor	Asst. Prof. of Biostatistical Sciences and Radiology, Wake Forest University School of Medicine
2003 - 2005	Enmin Song, PhD	NCIRE, Scientific Programming Specialist	Research/Scholarly Mentor, Project Mentor, Career Mentor	Joint Advisor	Professor, Huazhong University of Science and Technolgy, Wuhan, China
2010 - 2010	Sharon Kwan, MD	Radiology Resident	Research/Scholarly Mentor	Mentor for Department of Radiology and Biomedical Imaging Seed Grant application	UCSF Radiology and Biomedical Imaging Resident
2017 - 2017	Yingjia Chen	Postdoctoral Fellow	Research/Scholarly Mentor, Project Mentor, Career Mentor	Joint Advisor	Senior Data Analyst, Genentech.
2017 - 2018	Teresa Filshtein	Postdoctoral Fellow	Research/Scholarly Mentor, Career Mentor	Co-Advisor	Postdoctoral Fellow, UCSF Department of Epidemiology and Biostatistics
2018 - present	Thu Nguyen	Associate Specialist	Research/Scholarly Mentor, Project Mentor	K99 Mentor	Associate Specialist, UCSF Departement of Epidemiology and Biostatistics

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### FACULTY MENTORING

Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2008 - 2010	Timothy Durazzo, PhD	Assistant Adjunct Professor of Radiology and Biomedical Imaging	Research/Scholarly Mentor	K-award mentor	Assistant Adjunct Professor of Radiology and Biomedical Imaging
2014 - 2019	Howard J. Rosen	Professor of Neurology	Research/Scholarly Mentor	K-award mentor	Professor of Neurology
2016 - 2021	Spina Salvatore, MD	Assistant Adjunct Professor of Neurology	Research/Scholarly Mentor	K-award mentor	Assistant Adjunct Professor of Neurology
2019 - 2024	Adam Staffaroni, PhD	Assistant Professor, UCSF Memory & Aging Center	Research/Scholarly Mentor	K-award mentor	Assistant Professor of Neurology
2020 - present	Aaron Scheffler, PhD	Assistant Professor of Epidemiology and Biostatistics	Research/Scholarly Mentor	Primary faculty mentor	Assistant Professor of Epidemiology and Biostatistics
2020 - present	Efstathios Gennatas, PhD	Assistant Professor of Epidemiology and Biostatistics	Research/Scholarly Mentor,Career Mentor	Primary faculty mentor	Assistant Professor of Epidemiology and Biostatistics
2020 - present	Jean Feng, PhD	Assistant Professor of Epidemiology and Biostatistics	Research/Scholarly Mentor,Career Mentor	Teaching mentor	Assistant Professor of Epidemiology and Biostatistics
2020 - present	Fei Jiang, PhD	Assistant Professor of Epidemiology and Biostatistics	Research/Scholarly Mentor,Project Mentor,Career Mentor	Primary faculty mentor	Assistant Professor of Epidemiology and Biostatistics

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Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2021 - present	Lawren VandeVrede MD/PhD	Assistant Professor of Neurology	Research/Scholarly Mentor, Project Mentor	K-award mentor	Assistant Professor of Neurology
2023 - present	Matthew Durstenfeld MD	Assistant Professor of Medicine		K-award mentor	Assistant Professor of Medicine

## RESEARCH AND CREATIVE ACTIVITIES

### RESEARCH AND CREATIVE ACTIVITIES SUMMARY

My research activities are geared toward the development and application of statistical methods for research in medical imaging with applications in dementia and breast cancer. My overall goal is to develop methods that can improve and expand medical imaging and its impact in areas such as clinical diagnosis and prognosis, clinical trial biomarker development and disease severity assessment. From a medical imaging perspective, my latest primary research direction is in the development of new Bayesian image analysis statistical methodology that is formulated in Fourier space -- i.e. in terms of spatial frequencies which has the potential to revolutionize the field in terms of computational speed and simplicity as well as providing for an expanded set of problems that can be solved. I also have other ongoing research areas in image reconstruction and analysis of a range of non-invasive magnetic resonance imaging (MRI) modalities focused on imaging the human brain. From a statistical perspective, my primary research focus is on spatial, time-series and space-time modeling. In particular, I have published in the three major fields of spatial statistics: lattice/image analysis, spatial point processes, and continuous spatial process. In addition, I am involved in numerous large scale collaborative problems in the fields of medical imaging and these compose the majority of my research time as can be seen in my publication list.

**Bayesian image analysis in Fourier space:** The objective of this project is to develop a family of new medical imaging processing methods that will provide improvements over current practices. The approach is to reformulate Bayesian Image analysis into Fourier Space (BIFS). The originally inter-correlated and high-dimensional problem in image space is broken down into a set of independent one-dimensional problems in Fourier space (tied together by the new concept of a parameter function). The Fourier space independence enables development of powerful and easy to specify BIFS models with fast algorithms to compute posterior image estimates. BIFS will be applied to problems in breast cancer detection and delineating patterns of brain blood perfusion associated with dementia. An open-source software library has been developed for dissemination to the scientific community.

**Magnetic resonance imaging (MRI) modality reconstruction:** Innovative MRI modalities of the human brain promise to reveal biological changes that accompany neurodegenerative disease, psychiatric illness and brain injury. These modalities are capable of imaging blood perfusion (perfusion MRI), metabolite concentrations (magnetic resonance spectroscopic imaging, MRSI), and neural activation (functional MRI or fMRI). However, perfusion MRI, fMRI and MRSI have had limited clinical impact because they inherently rely on biophysical signals that are exceedingly subtle. Therefore, these MRI modalities must be imaged with poorer signal-to-noise-ratio (SNR) and at lower spatial resolution than conventional structural MRI. The objective of my MRI reconstruction work is to improve image quality and resolution by

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fusing low-SNR raw imaging data with high-resolution/high-SNR anatomical information, e.g., from structural MRI. The method of fusing is through a Bayes rule with the anatomical information incorporated via a prior distribution. The fusion of raw data and anatomical information in this principled fashion leads to greatly improved image reconstruction of the low-SNR modality. These improvements can be seen visually and numerically in terms of accuracy, precision, artifact reduction and resolution. The improved image accuracy and precision of these new reconstruction techniques provides for more powerful determination of disease specific effects across subjects. This increased power enables the potential use of these methods for determining biomarkers in clinical studies and improving diagnostic prediction for a range of neurodegenerative diseases, psychiatric conditions and brain injuries. My reconstruction methodology can be readily generalized to non-brain and non-MRI based imaging, leading to exciting potential applications in cardiac imaging, positron emission tomography, single photon emission tomography, ultrasound and MEG/EEG etc.

**Functional magnetic resonance imaging (fMRI) analysis:** fMRI signal detection is primarily focused on detecting signal changes in response to stimuli, actions or thoughts - the hemodynamic response signal (HDR). Interest lies in detecting and spatially defining patterns of change between different experimental conditions or how these patterns differ between one set of subjects and another (e.g. patients versus controls). My work on post-reconstruction statistical analysis is focused on improving detection and delineation of activation response patterns observed with functional MRI (fMRI). These improvements are based on improved time series and spatial statistical modeling designed to capture characteristics of brain responses that are missed by standard methods. I have developed new statistical models of the HDR that relax the overly restrictive parametric assumptions of standard methods. These new models are able to capture variation in the shape of the HDR across spatial locations that has not been seen before. The detection and description of this spatial variation has direct biological and clinical relevance. Furthermore, quantification of this spatial variation in HDR can increase statistical power to detect differences in HDR signals under different experimental conditions and between different disease groups. This increase in power has positive implications for generating clinical biomarkers of neurodegenerative disease, psychiatric illness and brain injury as well as improving diagnostic accuracy and optimal treatment strategy.

**Decision analysis for diagnostic testing:** I am developing a new Bayesian decision analysis approach for choosing between competing diagnostic technologies. Medical institutions often need to make decisions as to whether to introduce a new diagnostic procedure or to continue with an existing one and this decision can be particularly important in the field of medical imaging where costs are typically very high. My quantitative (Bayesian utility) approach to solving this decision problem provides an optimal balance between diagnostic accuracy and cost for deciding a) whether or not to introduce a new diagnostic procedure, or b) which of many procedures to assign individuals to. My approach accounts for costs of diagnosis and treatment, as well as consideration of quality of life improvements gained by more accurate diagnosis.

**Collaborative/translational research:** Outside of my individual research I perform extensive collaborative research activities with a particular focus on medical imaging/radiological research. This research forms the bulk of my work at UCSF. Many of these projects utilize my statistical expertise in longitudinal modeling, spatial and time series techniques. Many of these projects these projects are in the field of brain imaging for the study of illnesses such as multiple sclerosis, Alzheimer's disease, fronto-temporal lobe dementia, Gulf War illness, amyotrophic lateral sclerosis, human immunodeficiency virus, post-traumatic stress disorder, Creutzfeldt-Jakob disease, and corticobasal syndrome. I also work on many imaging problems outside the brain such as the study of breast cancer, thyroid cancer, prostate cancer, and osteoporosis/space-flight bone loss.

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**RESEARCH AWARDS - CURRENT**

1. 1U19AG063911-01 NIH ARTFL LEFFTDS Longitudinal Frontotemporal Lobar Degeneration (ALLFTD)	Co-Investigator Statistician	20 % effort 09/15/2019	Boeve (PI) 06/30/2024
This project will expand a North American research network that is preparing for clinical trials for FTLD.			
2. 2P01CA210961-06A1 NIH/NCI The I SPY 2.2 TRIAL: Evolving to Imaging and Molecular Biomarker Response Directed Adaptive Sequential Treatment to Optimize Breast Cancer Outcomes	Co-Investigator Statistician	20 % effort 07/01/2023	Esserman (PI) 06/30/2028
We have designed a clinical trial for women treated with drugs for early breast cancer before surgery, in which patients whose cancers do not respond to the initial experimental treatment can be switched to receive a different proven therapy that is considered the best for their particular type of cancer. Our goal is to develop a system that continuously improves our ability to provide each woman with the best chance at being cured, while also trying to avoid any unnecessary treatments that cause toxic side effects.			
3. R01 AG062758 NIH/NIA Diagnostic and prognostic certainty in behavioral variant frontotemporal dementia	Co-Investigator Statistician	10 % effort 08/15/2020	Perry (PI) 04/30/2025 \$ 4,018,729 total
The overarching goal of the proposed study is to improve diagnostic and predictive accuracy in bvFTD from the time of the first visit. Clinicians need guidance regarding which information carries the greatest weight in bvFTD diagnostic evaluation. International FTLD consortia are preparing for clinical trials, though predictive tools, including current biomarkers, are inadequate to avoid erroneous inclusion of individuals who are unlikely to have either a stable bvFTD diagnosis or an FTLD pathological diagnosis. More accurate predictive tools are needed to facilitate trial enrollment and give personalized estimates of expected progression.			
4. RF1AG077557 NIH/NIA Validating remote digital assessments for familial frontotemporal dementia	Co-Investigator Statistician	6 % effort 05/01/2022	Staffaroni (PI) 04/30/2025 \$ 2,371,437 total
The overarching goal of this project is to validate innovative, remote smartphone assessments for early disease detection and measurement of clinical disease progression in FTD.			
5. 1R01NS130066	Co-Investigatator Statistician	5 % effort	Morrison (PI)

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NIH/NINDS		09/01/2022	08/31/2027
Multimodal MRI to predict DBS motor and cognitive outcomes in Parkinson's disease		\$ 3,325,781 total	
The objective of this proposal is to evaluate the usefulness of preoperative fMRI, DTI, and QSM imaging data for multivariate prediction of motor and cognitive outcomes in Parkinson's disease in 100 patients receiving deep brain stimulation.			
Statistician			
6. PTCG-21-818270	Co-Investigator	3 % effort	Ljubenkov (PI)
Alzheimer's Association, Inc.		10/01/2021	09/30/2024
Veri-T: A phase 1b Placebo-Controlled Trial of Verdiperstat in FTLD-TDP		\$ 2,657,600 total	
The goal of this project is to support a phase 1 multisite clinical trial of Verdiperstat (BHV-3241) in patients with semantic variant primary progressive aphasia (svPPA)			
Statistician			
7. P01 AG019724-21A1	Co-Investigator	5 % effort	Gorno Tempini (PI)
NIH/NIA		06/01/2023	05/31/2028
Frontotemporal Dementia: Genes, Images, and Emotions			
The FTD PPG primary goal is to advance clinical practice in dementia by improving diagnosis and to further the understanding of the anatomy and biology of FTLD- spectrum disorders. The FTD PPG will benefit public health through advancing knowledge of clinical diagnostic processes, genomic, basic, translational, and clinicopathological research regarding prevalent neurodegenerative diseases and common mood disorders of aging.			
Statistician			

**RESEARCH AWARDS - PAST**

1. R01 EB00207, previously AG12119	Co-Investigator		Maudsley (PI)
NIH/NIBIB		02/01/1996	01/31/2004
Data Processing for MRSI		\$ 133,469 direct/yr 1	\$ 793,174 total
This grant aimed to develop new techniques for magnetic resonance spectroscopic imaging data processing.			
2. 5P01AA11493	Co-Investigator		Weiner (PI)
NIH/NIAAA		09/07/1998	08/31/2005
Chronic Alcohol Abuse - Effects on HIV CNS Morbidity	\$ 1,088,197 direct/yr 1	\$ 6,541,662 total	
The major goal of this project was to determine the effects of chronic alcohol abuse on HIV, PNS, and CNS morbidity.			
3. DAMD 17-01-1-0764	Co-Investigator		Weiner (PI)

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Department of Defense	08/01/2001	07/31/2006
Magnetic Resonance and Spectroscopy of the Human Brain in Gulf War Illness	\$ 689,203 direct/yr 1	\$ 4,134,486 total

The main goal of this grant was to determine metabolite differences in Gulf War Illness subjects detectable by magnetic resonance spectroscopic imaging.

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4. R01 NS41946	Co-Investigator	Maudsley (PI)
NIH/NINDS	08/15/2001	07/31/2006
Proton MR Spectroscopic Imaging of Epilepsy	\$ 225,000 direct/yr 1	\$ 1,125,000 total

The main goal of this grant was to determine metabolite level differences in Epilepsy subjects using proton magnetic resonance spectroscopic imaging.

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5. N000014-02-1-0052	Co-Investigator	Cressie (PI)
Office of Naval Research	10/15/2001	09/30/2004
Spatial Statistics for Command and Control	\$ 150,000 direct/yr 1	\$ 482,851 total

This grant aimed to use spatial statistics methods to determine optimal strategies for command and control in the presence of potential hostile threats.

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6. K23 N8045013	Co-Investigator	Cha (PI)
NIH	08/01/2003	04/30/2008
Brain Tumor Imaging: Quantitative MRI and 1H MRS	\$ 149,450 direct/yr 1	\$ 747,250 total

The goal of this grant was to utilize traditional magnetic resonance imaging (MRI) and other physiology based imaging (such as proton MR spectroscopy, perfusion MRI) to characterize tumor malignancy and correlate MRI-derived physiologic variables with histopathology.

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7. P01AG012435	Co-Investigator	Chui (PI)
NIH	09/30/2003	05/31/2008
Aging Brain: Vasculature, Ichemia, and Behavior: 1H MRSI and Perfusion MRI of SIVD (Project 2)	\$ 184,241 direct/yr 1	\$ 963,558 total

The primary goal of this project was to address four major areas of inquiry in subcortical ischemic vascular dementia (SIVD): the role of ongoing ischemia; the role of infarction in neuron loss; the role of disconnection of subcortical and cortical structures in SIVD; and the relative differences in subcortical and cortical changes between SIVD and Alzheimer's Disease.

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8. U54 HL070587	Co-Investigator	Helms (PI)
NIH/NHLBI	07/01/2004	03/31/2007

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Neuropsychological Dysfunction and Neuroimaging      \$ 237,681      \$ 808,428 total  
Abnormalities in Neurologically Intact Adults with Sickle direct/yr 1  
Cell Disease

Our primary role in this cooperative agreement was to act as the coordinating center for MRI. We helped select MRI scanners, and perform quality assessment at the onset of and during the study.

9. U01 AG024904-01	Co-Investigator	Weiner (PI)
NIH/NIA	09/30/2004	08/31/2009
Alzheimer's Disease Neuroimaging Initiative	\$ 13,515,150 direct/yr 1	\$ 57,211,517 total
The primary goal of this project is to develop improved methods, which will lead to uniform standards for acquiring longitudinal, multi-site MRI and PET data on patients with Alzheimer's disease (AD), mild cognitive impairment (MCI), and elderly controls.		
10. PR043109	Co-Investigator	Weiner (PI)
Department of Defense	10/01/2004	09/30/2008
Magnetic Resonance Study of Amyotrophic Lateral Sclerosis and Gulf War Illness at 4 Tesla	\$ 500,000 direct/yr 1	\$ 2,500,000 total
The primary goal of this study was to assess the effects of Amyotrophic Lateral Sclerosis and Gulf War Illness detectable by 4 Tesla MRI of the human brain.		
11. B3776	Co-Investigator	Weiner (PI)
Veteran's Affairs	01/01/2005	12/31/2009
Effects of Gulf War Illness on Brain Structure, Function, and Metabolism: MRI/MRS at 4 Tesla	\$ 376,950 direct/yr 1	\$ 2,500,000 total
The primary goal of this project is to develop improved methods, which will lead to uniform standards for acquiring longitudinal, multi-site MRI and PET data on patients with Alzheimer's disease (AD), mild cognitive impairment (MCI), and elderly controls.		
12. R01 EB0047079	Co-Investigator	Lu (PI)
NIH	04/01/2006	03/31/2009
Statistical Methods for Evaluation of Diagnostic Tests	\$ 180,000 direct/yr 1	\$ 562,500 total
The major goal of this grant is to develop statistical methods for the evaluation of non-inferiority tests and for accurate estimation of relative risk using cross-sectional and short-term follow-up data.		
13. RG3517A	Co-Investigator	Pelletier (PI)
National Multiple Sclerosis Society	07/01/2006	06/30/2010

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In Vivo Assessment of Glutamate in MS Using H-MRS at 3T	\$ 292,129 direct/yr 1	\$ 577,094 total
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The major goal of this grant is to conduct a 3-year longitudinal study to evaluate the use of high field (3T) proton MR spectroscopy combined with new acquisition sequences to monitor the treatment effect in MS patients of agents that target glutamate homeostasis.

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14. SIIM	PI	Kornak (PI)
Society for Imaging Informatics in Medicine	07/01/2007	06/30/2008
Improved Reconstruction of Low-Resolution Magnetic Resonance Modalities	\$ 31,158 direct/yr 1	\$ 31,158 total

The major goal of this project was to develop statistical techniques for the improved reconstruction of perfusion weighted imaging and magnetic resonance spectroscopic imaging via the use of high-resolution anatomical prior information and k-space data modeling.

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15. HHSN267200700005C	Co-Investigator	Johansen (PI)
NIH/NIDDK	07/01/2007	06/30/2014
USRDS Nutritional Special Studies Center	\$ 532,796 direct/yr 1	\$ 2,663,980 total

The goals of this project are to investigate the effects of nutritional parameters on outcomes in ESRD using existing USRDS data and investigator-initiated data collection projects.

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16. BL01301	Co-Investigator	Lang (PI)
National Space Biomedical Research Institute	09/01/2007	08/31/2011
An Integrated Musculoskeletal Countermeasure Battery for Long-Duration Lunar Missions	\$ 73,501 direct/yr 1	\$ 681,982 total

This contract is to develop a single compact exercise device applicable to the Orion Crew Module, Lunar Lander or Lunar Base that integrates lower and upper body resistive training, cardiovascular training and sensorimotor training. Validate the efficacy of this device for reduction of bone loss, muscle loss, loss of cardiovascular function and loss of neuromuscular performance in the ongoing bedrest study at the NASA Flight Analog Center, University of Texas, Galveston.

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17. DOD	Co-Investigator	Young (PI)
Department of Defense	08/01/2008	07/31/2010
Information Theoretic Analysis for Sensitive Detection of Structural and Metabolic Patterns in Multimodal MR Image Studies of Head Trauma	\$ 96,875 direct/yr 1	\$ 193,750 total

The overall aim of this proposal is to develop sensitive diagnostic markers for mild and moderate traumatic brain injury using information theory based complexity/texture measures from multimodal MR images.

Prepared: May 27, 2024

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18. P41 RR023953	Project PI	Weiner (PI)
NIH/NCRR	09/15/2008	06/30/2014
NIH Resource for MRI of Neurodegenerative Disorders.	\$ 1,294,990 direct/yr 1	\$ 4,546,761 total

The Resource grant aims to improve acquisition, reconstruction, and processing of structural, perfusion, diffusion, and spectroscopic MRI. The project for which I am PI is titled: "Bayesian Image Reconstruction from Reduced k-Space Data". The project aims to develop and evaluate methodology to improve reconstruction of low signal-to-noise ratio perfusion MRI through incorporating high-resolution anatomical information from structural MRI.

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19. UCSF Radiology Seed	PI	Kornak (PI)
UCSF, Department of Radiology and Biomedical Imaging Seed Grant	02/01/2009	07/28/2011
Quantifying Spatial Variation in the Hemodynamic Response Function Specific to Traumatic Brain Injury	\$ 9,600 direct/yr 1	\$ 9,600 total

This grant aims to use functional MRI and new statistical modeling approaches to determine spatial parameters of hemodynamic response shape that are indicative of traumatic brain injury.

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20. REAC	PI	Kornak (PI)
UCSF REAC Pilot Research Award for Junior Investigators	06/01/2009	05/31/2011
Quantifying Spatial Variation in the Hemodynamic Response Function Specific to Alzheimer's Disease	\$ 29,963 direct/yr 1	\$ 29,963 total

This proposal aims to determine brain hemodynamic parameters specific to Alzheimer's disease via improved statistical modeling and spatial mapping of functional MRI responses.

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21. 1. Administrative Supplement to Project PI P41 RR023953		Weiner (PI)
NIH/NCRR	08/24/2009	08/31/2011
Administrative Supplement to NIH Resource for MRI of Neurodegenerative Disorders	\$ 500,000 direct/yr 1	\$ 1,000,000 total

This Administrative Supplement is part of an NIH Resource for MRI of Neurodegenerative Disorders focused on improving acquisition, reconstruction, and processing of structural, perfusion, diffusion, and spectroscopic MRI. My project as PI concerned the development of 3D k-space Bayesian Reconstruction of 3D GRASE perfusion MRI.

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22. 1RC1AR058405-01	Co-Investigator	Link (PI)
NIH	09/30/2009	08/31/2011
Cortical Bone Porosity Identifies Diabetes Subjects with Fragility Fractures	\$ 340,496 direct/yr 1	\$ 682,264 total

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The major goal of this grant is to study cortical and trabecular bone architecture in diabetes subjects with and without osteoporotic fractures and to compare these findings to those in normal subjects and osteoporotic fracture subjects.

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23. Subcontract to: R01NS062885- PI of Subcontract 01		Pelletier (PI)
NIH/NINDS	10/01/2009	09/30/2014
Molecular and Genetic Predictors of Disability Progression in MS	\$ 499,738 direct/yr 1	\$ 2,154,171 total

This project aims to determine longitudinal study to evaluate the ability of baseline glutamate to predict longitudinal NAA change and brain atrophy representative of multiple sclerosis using high field (3T) proton MR spectroscopy.

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24. R01 CA148708	Co-Investigator	Noworolski (PI)
NIH/NCI	07/01/2010	06/30/2015
DCE MRI to Improve Prostate Cancer Identification and Characterization.	\$ 254,940 direct/yr 1	\$ 1,428,152 total

The goals of this grant are to improve the identification and characterization of aggressiveness of prostate cancer by utilizing novel pharmacokinetic and statistical models.

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25. CTSI-SOS	PI	Kornak (PI)
UCSF, CTSI-SOS Program	02/01/2012	06/30/2013
K-Bayes for functional MRI	\$ 29,962 direct/yr 1	\$ 29,962 total

The goal of this proposal is to develop a superior reconstruction procedure for functional MRI (K-Bayes) that increases the power to detect and quantify functional patterns in the human brain.

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26. CTSI-Methodology	PI	Kornak (PI)
UCSF, CTSI Consultants Methodology Award	07/01/2012	06/30/2013
Targeted Learning Algorithms for Detecting Imaging Biomarkers in Large Databases	\$ 20,000 direct/yr 1	\$ 20,000 total

The goal of this proposal is to develop practical learning algorithms that incorporate Bayesian imaging priors to detect disease biomarkers in large imaging databases.

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27. R01AG032306-01	Co-Investigator	Rosen (PI)
NIH/NIA	10/01/2009	09/30/2015
The Frontotemporal Lobar Degeneration Neuroimaging Initiative.	\$ 1,730,132 direct/yr 1	\$ 6,940,480 total

The purpose of this project is to determine imaging modalities most useful for proving biomarkers of frontotemporal lobar degeneration in clinical trials.

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28. Komen SAC 110017	Co-Investigator Susan G. Komen for the Cure MR Imaging Phenotypes of Breast Cancer	12/10/2010 \$ 180,354 direct/yr 1	Hylton (PI) 12/09/2015 \$ 901,770 total
The goal of this project is to develop and evaluate high spatial resolution non-contrast approaches for evaluating breast tissue.			
29. 1U01 CA15123	Co-Investigator NIH/NCI Quantitative Imaging for Assessing Breast Cancer Response to Treatment	09/26/2011 \$ 493,969 direct/yr 1	Hylton (PI) 08/31/2016 \$ 2,469,845 total
The goal of this project is the improved integration of MRI-based quantitative imaging (Q1) for evaluating response to treatment in clinical trials of women receiving pre-operative (neoadjuvant) treatment for breast cancer.			
30. Quest	Co-Investigator Quest Diagnostics Inc. Dementia Pathway Neuroimaging Core Phase 1A	10 % effort 01/01/2015 \$ 173,382 direct/yr 1	Hess (PI) 10/01/2017
The goal is to work towards a system that could be deployable across different imaging platforms and would provide guidance to providers, both through standardization of acquisition and visual interpretation protocols and automated analysis to support diagnostic decision making.			
Although grant is ongoing I have temporarily suspended taking funds from the grant, but will resume later as I still have funds available to me.			
31. R01HL128679	Co-Investigator NIH/NHLBI Develop&validate SuperAlarm to Detect Patient Deterioration with Few False Alarms	8 % effort 07/20/2015 \$ 335,195 direct/yr 1	Hu (PI) 04/30/2019 \$ 1,675,975 total
Critical care patient monitoring remains unsatisfactory as evidenced by the alarm fatigue problem it has created. We propose to develop a data fusion framework to integrate monitor alarms, laboratory test results, and other non-monitored physiological variables to realize a more precise way of monitoring patients to provide early detection of patient crisis events with few false alarms. Our project will lead to a potentially transformative paradigm change of critical care patient monitoring towards a more integrated and precise system for recognizing crisis events and enabling early interventions and produce a database to the community to propel further development of predictive models.			
Although grant is ongoing, I will only continue to help with final statistical analysis at a later date.			
32. C1CMS331346-01-010	Co-Investigator CMS The Centers for Medicare and Medicaid Services	5 % effort 09/01/2014	Miller (PI) 08/31/2017

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The UCSF and UNMC Dementia Care Ecosystem:  
 Using Innovative Technologies to Personalize and  
 Deliver Coordinated Dementia Care

Most dementia care today is crisis-oriented. To break away from the cycle of stressful and costly issues that arise from a reactive approach, the Care Ecosystem will emphasize coordinated, continuous and personalized care. This proactive care model aims to improve health and satisfaction for participants and their caregivers. The study will also try to reduce avoidable emergency room visits, hospitalizations, or institutionalization, such as entering a nursing home

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33. Bluefield Project	Co-Investigator	5 % effort	Seeley (PI)
Bluefield Project to Cure FTD		06/01/2015	05/31/2017
Disease detection and monitoring: neuroimaging biomarkers for GRN mutation-related frontotemporal dementia		\$ 191,197 direct/yr 1	

In this application, we propose to take on these challenges for a specific form of frontotemporal dementia (FTD) caused by mutations in GRN, which result in progranulin haploinsufficiency and a variable age at dementia onset, most commonly in mid-life.

Evidence from our group and others suggests that GRN-related symptomatic FTD (henceforth "GRNFTD") can be viewed as a network-based disorder in which TDP-43 inclusions, neuroinflammation, and neurodegenerative changes begin within one of three rostral brain networks involved in behavior, language, or motor function before spreading into other brain regions.

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34. U01AG04539	Co-Investigator	20 % effort	Boeve (Sub-contract PI: Rosen) (PI)
NIH - subcontract to Mayo Foundation/Mayo Clinic		09/30/2014	05/31/2019
Longitudinal Evaluation of Familial Frontotemporal Dementia Subjects (LEFFTDS)		\$ 579,721 direct/yr 1	\$ 2,898,605 total

The role of UCSF in the grant will be two-fold. First, UCSF will be one of three sites enrolling f-FTLD family members and performing clinical and longitudinal follow-up. UCSF will take primary responsibility for processing T1 weighted MRIs for cortical thickness, and for doing the primary PET and icfMRI processing. Lastly, UCSF will manage the secure online database that will permit direct entry of the study data from each clinical site, and assist all investigators with database queries as needed. -- Currently in no-cost extension

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35. U54NS092089	Co-Investigator	5 % effort	Boxer (PI)
NIH/NINDS		09/30/2014	07/31/2019
The Frontotemporal Lobar Degeneration Clinical Research Consortium		\$ 1,250,000 direct/yr 1	\$ 6,250,000 total

The overarching goal of this proposal is to build a FTLD clinical research consortium (FTLD CRC) to support the development of FTLD therapies.

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36. R01CA132870	Co-Investigator	10 % effort	Hylton (PI)
NIH		04/28/2008	06/30/2020
Real-time In Vivo MRI Biomarkers for Breast Cancer	\$ 350,035		
Pre-Operative Treatment Trials	direct/yr 1		
The goal of this project is to better enable the integration of imaging biomarkers into clinical trials by making imaging biomarkers available in real-time as part of the clinical workflow for breast MRI. Investigators at UCSF lead a large multi-center effort investigating MRI and molecular markers for assessing breast cancer response to pre-operative chemotherapy			
Statistician			
37.	Co-Investigator	2 % effort	Scheffler (PI)
UCSF COVID-19 Rapid Response Pilot Grant Initiative	06/01/2020		12/01/2020
Funding Collaborative			
SER models for Covid-19 for Contact Tracing	\$ 40,000		
	direct/yr 1		
Applying SER models for Covid-19 and to study effectiveness of contact tracing			
Co-Investigator			
38. UL1 RR024131	Head of Biostatistics Consulting Service	10 % effort	Grandis (PI)
NIH-NCRR		07/01/2016	06/30/2021
Clinical and Translational Science Institute			
The overarching goal of the Clinical and Translational Science Institute (CTSI) is to create an integrated academic home that transforms training in and conduct of clinical and translational research both at UCSF and the greater Bay Area community. Components of the CTSI include formal didactic programs, career development pathways, a variety of consultative and technical Cores, and community outreach. Dr. Kornak leads the biostatistical consulting service.			
39. R01EB022055	Principal Investigator	5 % effort	Kornak (PI)
NIH -- NIBIB		04/15/2017	01/31/2022
Bayesian image analysis in Fourier space	\$ 225,000		\$ 900,000 total
	direct/yr 1		
The objective of this project is to develop a family of new medical imaging processing methods that will provide improvements over current practices. The approach is to reformulate Bayesian Image analysis into Fourier Space (BIFS). The originally inter-correlated and high-dimensional problem in image space is broken down into a set of independent one-dimensional problems in Fourier space (tied together by the new concept of a "parameter function"). The Fourier space independence enables development of powerful and easy to specify BIFS models with fast algorithms to compute posterior image estimates. BIFS will be applied to problems in breast cancer detection and delineating patterns of brain blood perfusion associated with dementia. An open source software library will be developed for dissemination to the scientific community.			

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40. R01CA227763	Co-Investigator NIH	10 % effort 02/01/2019	Hylton (PI) 01/31/2024
Dedicated breast PET and MRI for characterization of breast cancer and its response to therapy.			
The objective of this academic-industrial partnership (AIP) project is to demonstrate the utility of dedicated breast positron emission tomography (dbPET) for characterizing primary breast cancers and their response to neoadjuvant chemotherapy (NAC).			
Statistician			
41. P01 AG019724	Co-Investigator NIH/NIA	5 % effort 06/01/2017	Miller (PI) 05/31/2022
Frontotemporal DementiaTD: Genes, Images and Emotions			
\$ 141,782 direct/yr 1			
The overall goal of this project is to investigate the early changes in FTLD using imaging, and cognitive and behavioral assessment. Dr. Rosen directs the imaging core for the grant.			
Statistician			
42. R01 AG029577	Co-Investigator NIH/NIA	5 % effort 07/01/2019	Rankin (PI) 06/30/2024
Attention and Semantic Evaluation as Predictors of Empathy in Healthy Aging and Frontotemporal Dementia			
\$ 524,819 direct/yr 1			
The goals of this project are to determine the value of socioemotional testing for predicting patients' clinical trajectories, and to elucidate how two selectively vulnerable neural networks contribute to normal social behavior and to the socioemotional symptoms of bvFTD. By modeling patients' socioemotional test performance over time, we will maximize our ability to predict and measure symptom progression in upcoming clinical treatment trials for bvFTD. Also, by developing our understanding of the neural network underpinnings of socioemotional behavior and empathy, we will be able to more precisely measure and monitor how these circuits malfunction to cause behavior symptoms in bvFTD and other neurologic and psychiatric disorders.			
Statistician			
43. R01CA227763	Co-Investigator NIH/NCI	20 % effort 02/15/2019	Hylton (PI) 01/31/2024
Dedicated breast PET and MRI for characterization of breast cancer and its response to therapy			
\$ 2,928,013 total			
The objective of this academic-industrial partnership (AIP) project is to demonstrate the utility of dedicated breast positron emission tomography (dbPET) for characterizing primary breast cancers and their response to neoadjuvant chemotherapy (NAC).			
Statistician			

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## BOOKS AND CHAPTERS

1. 2006 Du, A.T., Schuff, N., Chao,L.L. , Kornak, J., Ezekiel, F., Jagust, W.J., Kramer, J.H., Reed, B.R., Miller, B.L., Norman, D., Chui, H.C., Weiner, M.W. White matter lesions are associated with cortical atrophy more than entorhinal and hippocampal atrophy. Eds: Nishimura and A. Gregory Sorensen. International Congress Series, Publisher: Elsevier. 1290, 89-100, 2006
2. 2017 Zhao, Q., Lu, Y., **Kornak, J.** Medical Signal and Image Analysis. In Handbook of Medical Statistics. Ed: Fang Ji-Qian. 737-763, 2017

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## OTHER PUBLICATIONS

1. 2005 **Kornak, J.**, and Young, K. - On the comparison of analytic optimization algorithms for the reconstruction of low-resolution k-space data in high-resolution transformed space. Proceedings of CMM 2005 - Computational Methods in Mechanics, Czestochowa, Poland, 2005.
2. 2014 **Kornak, J.** - Bayesian image analysis in Fourier space (BIFS). In JSM Proceedings, Statistics in Imaging Section. Alexandria, VA: American Statistical Association. 1487-1492. 2014.
3. 2020 **Kornak J**, Boylan R, Young K, Wolf A, Cobigo Y, Rosen H. Bayesian Image Analysis in Fourier Space Using Data-Driven Priors (DD-BIFS). In International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems 2020 Jun 15 (pp. 380-390). Springer, Cham.

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## SIGNIFICANT PUBLICATIONS

1. 2019

**Kornak J**, Fields J, Kremers W, Farmer S, Heuer HW, Forsberg L, Brushaber D, Rindels A, Dodge H, Weintraub S, Besser L, Appleby B, Bordelon Y, Bove J, Brannelly P, Caso C, Coppola G, Dever R, Dheel C, Dickerson B, Dickinson S, Dominguez S, Domoto-Reilly K, Faber K, Ferrall J, Fishman A, Fong J, Foroud T, Gavrilova R, Gearhart D, Ghazanfari B, Ghoshal N, Goldman J, Graff-Radford J, Graff-Radford N, Grant IM, Grossman M, Haley D, Hsiao J, Hsiung R, Huey ED, Irwin D, Jones D, Jones L, Kantarci K, Karydas A, Kaufer D, Kerwin D, Knopman D, Kraft R, Kramer J, Kukull W, Lapid M, Litvan I, Ljubbenkov P, Luente D, Lungu C, Mackenzie I, Maldonado M, Manoochehri M, McGinnis S, McKinley E, Mendez M, Miller B, Multani N, Onyike C, Padmanabhan J, Pantelyat A, Pearlman R, Petrucelli L, Potter M, Rademakers R, Ramos EM, Rankin K, Rascovsky K, Roberson ED, Rogalski-Miller E, Sengdy P, Shaw L, Staffaroni AM, Sutherland M, Syrjanen J, Tartaglia C, Tatton N, Taylor J, Toga A, Trojanowski J, Wang P, Wong B, Wszolek Z, Boeve B, Boxer A, Rosen H. Nonlinear Z-score modeling for improved detection of cognitive abnormality. *Alzheimers Dement (Amst)*. 2019 Dec; 11:797-808. PMID: 31872042. PMCID: PMC6911910

The work in this paper was developed for the ALLFTD Consortium whose aim is to examine longitudinal Frontotemporal Lobar Degeneration. The project arose because conventional linear approaches to develop normative neuropsychological scores that account for age and educational level were found to be inadequate leading to counter-intuitive results. These results occurred because of the linear and constant variance assumptions inherent to the linear models that are in standard use for normative scores. For this paper we extended the conventional approach to use shape-constrained additive models such that both non-linear monotonic effects can be modeled, and non-constant variance incorporated. This new approach has led to normative score calculators that clinicians feel are more consistent with expectations and it has been adopted within the ALLFTD study and is beginning to be used more widely.

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2. 2023 Casaletto, K. B., **Kornak, J.**, Paolillo, E. W., Rojas, J. C., VandeBunte, A., Staffaroni, A. S., ... & ALLFTD Consortium. (2023). Association of physical activity with neurofilament light chain trajectories in autosomal dominant frontotemporal lobar degeneration variant carriers. *JAMA neurology*, 80(1), 82-90.

This paper provides an example of my collaborative work. My extensive knowledge on statistical methods for working with longitudinal methods in dementia using imaging and other biomarker data. My objective when working on such projects is to work in a trans-disciplinary fashion such that there is a synergy between the clinical expertise and optimizing experimental design and statistical strategy. I worked as an advisor to a large degree on this project. Dr. Casaletto, the lead author, has asked me to be a statistical mentor on her NIH K-award application. Working this way means that I often act as a "teacher" while also helping directly with the experimental planning and statistical analysis.

3. 2011 **Kornak J.** Lu Y. Bayesian decision analysis for choosing between diagnostic procedures (with an application in osteoporotic hip fracture assessment). *Statistics and Its Interface*. 2011; 4:27-36. PMID: 23243483. PMCID: PMC3520495.

This paper describes a quantitative technique to aid the decision of whether to adopt a new diagnostic method. The decision process for diagnostic procedures is complicated by the fact that diagnostic decisions are typically based on thresholding one or more continuous variables. Therefore, my formal decision process accounts for uncertainty in the optimal threshold value for each diagnostic procedure. My approach uses a Bayesian decision approach based on maximizing expected utility (incorporating patient-benefit, accuracy and costs) with respect to diagnostic procedure and threshold level simultaneously. I proposed the original idea, developed the method, wrote the code, ran the applications, and wrote the paper.

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4. 2010

**Kornak J.** Young K, Soher BJ, Maudsley AA. Bayesian k -space-time reconstruction of MR spectroscopic imaging for enhanced resolution. IEEE Trans Med Imaging. 2010 Jul; 29(7):1333-50. PMID: 20304734. PMCID: PMC2911978

This paper provides a comprehensive description of the development and implementation of K-Bayes for magnetic resonance spectroscopic imaging (MRSI.). There is a comprehensive mathematical development of the K-Bayes reconstruction methodology for MRSI, along with multiple applications and simulation studies. The K-Bayes MRSI model extends on the model for perfusion MRI in manuscripts 29 and 30 via the additional consideration of a time dimension, thereby adding an extra level of complexity and computational difficulty. MRSI data sets consists of a time series at each k-space point that itself consists of overlapping metabolite signals □ each occurring at the their own resonance frequencies and with their own rates of exponential decay. The K-Bayes MRSI model incorporates a full k-space-time likelihood model for the signal over a set of metabolites and combines it with an anatomical prior model based on structural MRI. The ensuing posterior distribution is maximized to provide a set of reconstructed metabolite maps. I had the initial idea of developing K-Bayes for reconstructing MRSI, developed the K-Bayes model for MRSI and associated computational algorithm for the reconstruction procedure, implemented the procedure, ran the applications and wrote the paper.

5. 2009

**Kornak J.** Dunham B, Hall DA, Haggard MP. Nonlinear voxel-based modeling of the haemodynamic response function in fMRI. Journal of Applied Statistics. 36(3): 237-253, 2009.

This paper presents new non-linear models of the brain hemodynamic response (HDR) to stimuli, actions or thoughts capable of capturing response shape characteristics missed by standard models. The application of these new models to fitting the HDR in this paper demonstrates coherent spatial variation in response shape within regions of brain activation. Understanding and properly modeling these spatial variations in HDR shape could have important implications for understanding hemodynamic brain changes due to neurodegenerative diseases, psychiatric illnesses or/and brain injury. For this paper, I had the initial idea to reformulate models for the HDR, performed all model development and application, and wrote the paper.

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## OTHER CREATIVE ACTIVITIES

1.        2005-06 Course notes and Powerpoint presentations for the Statistics for Radiology course and the lecture series for Radiology Residents  
            2006        Powerpoint presentations for tutorials presented at Center for Imaging of Neurodegenerative Diseases (VA Medical Center)  
            2006-07 Powerpoint presentation for Medical Imaging Informatics lecture  
            2009        Powerpoint presentations for Statistics for Radiology and Biomedical Imaging course  
            2011-15 Revised lecture Powerpoint presentations for TICR Biostat 209 course  
            2016-17 Developed course notes and lectures for TICR Biostat 202 course  
            2017-18 Developed course notes and lectures for TICR Biostat 216 course
2.        See statistical review lectures under "Invited Presentations."